Reference Document End Points

ASCE7

- 2016 ASCE 7 Standard (ASCE7-16)
- 2010 ASCE 7 Standard (ASCE7-10)
- 2005 ASCE 7 Standard (ASCE7-05)

ASCE41

- 2017 ASCE 41 Standard (ASCE41-17)
- 2013 ASCE 41 Standard (ASCE41-13)

NEHRP

- 2009 NEHRP Standard (NEHRP-2009)
- 2015 NEHRP Standard (NEHRP-2015)

IBC
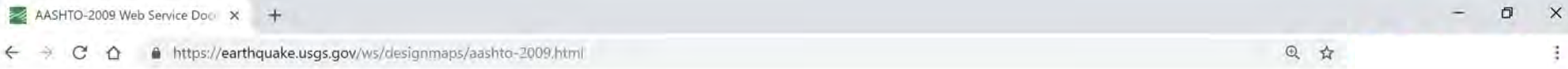
- 2012 IBC Standard (IBC-2012)
- 2015 IBC Standard (IBC-2015)

AASHTO

- 2009 AASHTO Guide Specifications (AASHTO-2009)

1. Using a web browser such as Google Chrome or Mozilla Firefox, go to https://earthquake.usgs.gov/ws/designmaps

2. Click on design document of interest, such as AASHTO-2009

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AASHTO-2009 Web Service Doc ×   +

← → C ⌂ 🔒 https://earthquake.usgs.gov/ws/designmaps/aashto-2009.html   ⊕ ☆   ⋮

Example ⟨3⟩

Request

https://earthquake.usgs.gov/ws/designmaps/aashto-2009.json?latitude=34&longitude=-118&siteClass=C&title=Example ⟨4⟩

Response

```
{
    "request": {
        "date": "2018-06-03T00:50:52.810Z",
        "referenceDocument": "AASHTO-2009",
        "status": "success",
        "url": "https://earthquake.usgs.gov/ws/designmaps/aashto-2009.json?latitude=34&longitude=-118&siteClass=C&title=
        "parameters": {
            "latitude": 34,
            "longitude": -118,
            "siteClass": "C",
            "title": "Example"
        }
    },
    "response": {
        "data": {
```

3. Scroll down to Example

4. Click on example request

https://earthquake.usgs.gov/ws/
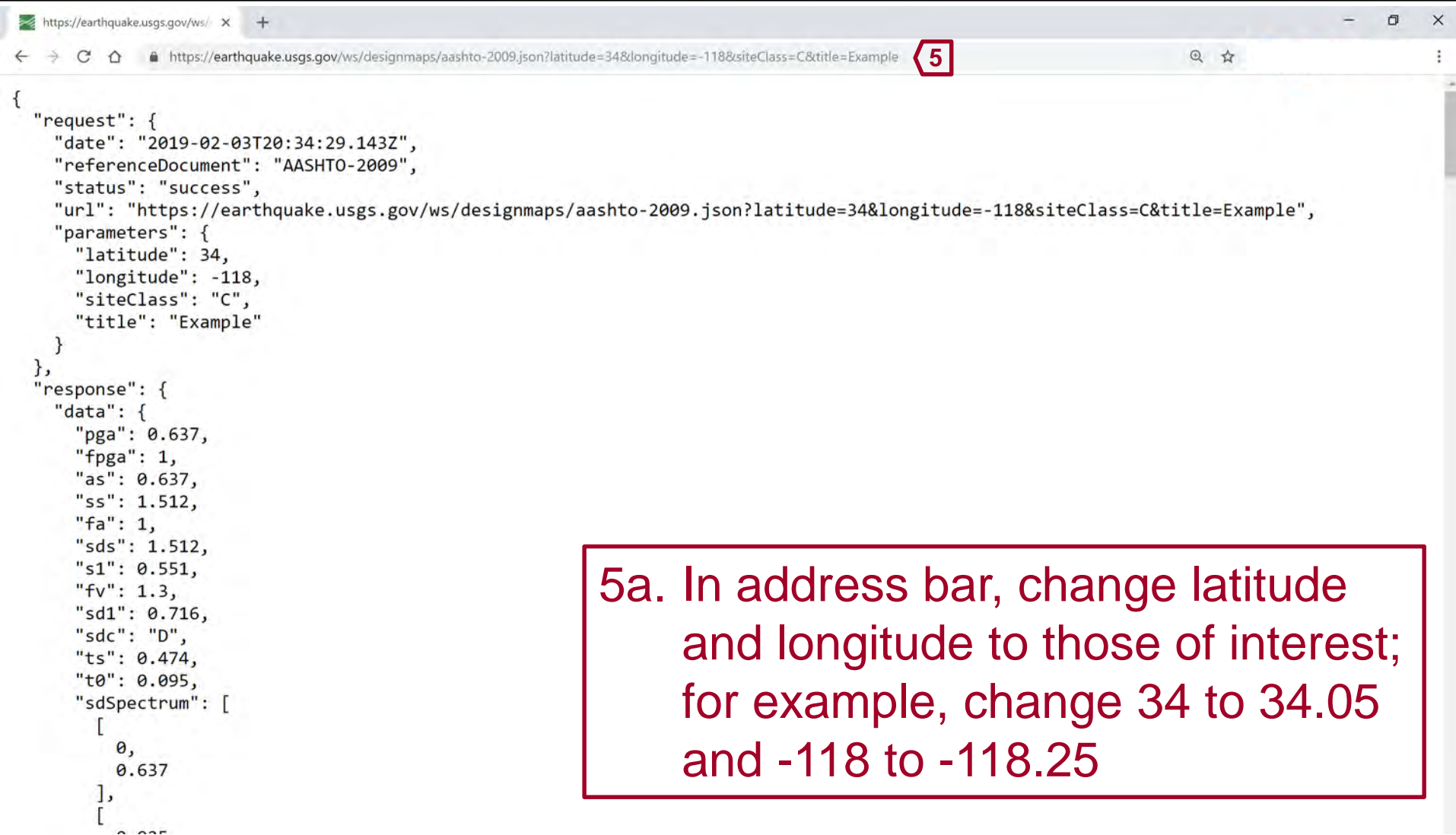
https://earthquake.usgs.gov/ws/designmaps/aashto-2009.json?latitude=34&longitude=-118&siteClass=C&title=Example ⑤

```
{
  "request": {
    "date": "2019-02-03T20:34:29.143Z",
    "referenceDocument": "AASHTO-2009",
    "status": "success",
    "url": "https://earthquake.usgs.gov/ws/designmaps/aashto-2009.json?latitude=34&longitude=-118&siteClass=C&title=Example",
    "parameters": {
      "latitude": 34,
      "longitude": -118,
      "siteClass": "C",
      "title": "Example"
    }
  },
  "response": {
    "data": {
      "pga": 0.637,
      "fpga": 1,
      "as": 0.637,
      "ss": 1.512,
      "fa": 1,
      "sds": 1.512,
      "s1": 0.551,
      "fv": 1.3,
      "sd1": 0.716,
      "sdc": "D",
      "ts": 0.474,
      "t0": 0.095,
      "sdSpectrum": [
        [
          0,
          0.637
        ],
        [
```

5a. In address bar, change latitude and longitude to those of interest; for example, change 34 to 34.05 and -118 to -118.25

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https://earthquake.usgs.gov/ws/designmaps/aashto-2009.json?latitude=34.05&longitude=-118.25&siteClass=C&title=Example ⑤
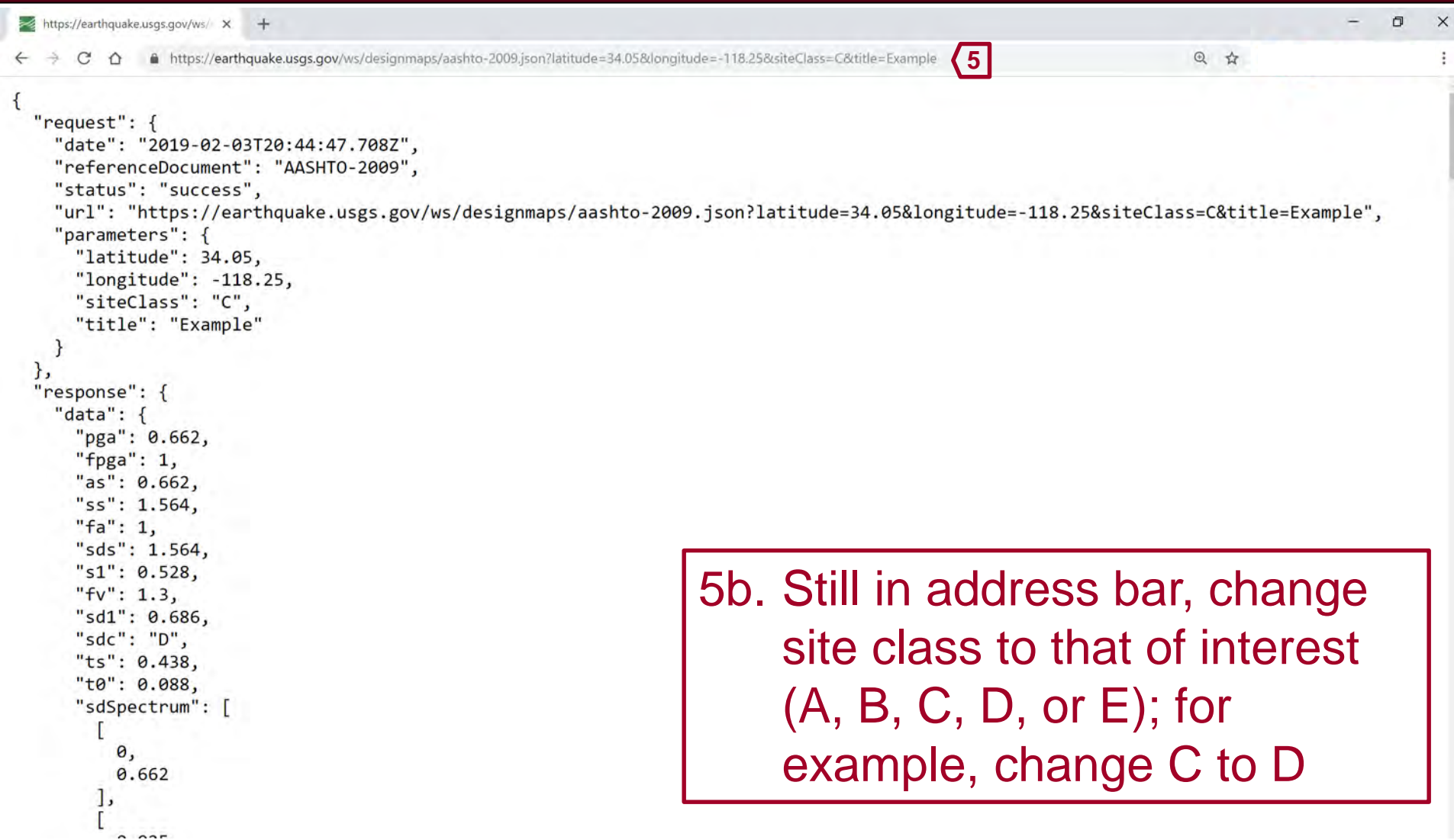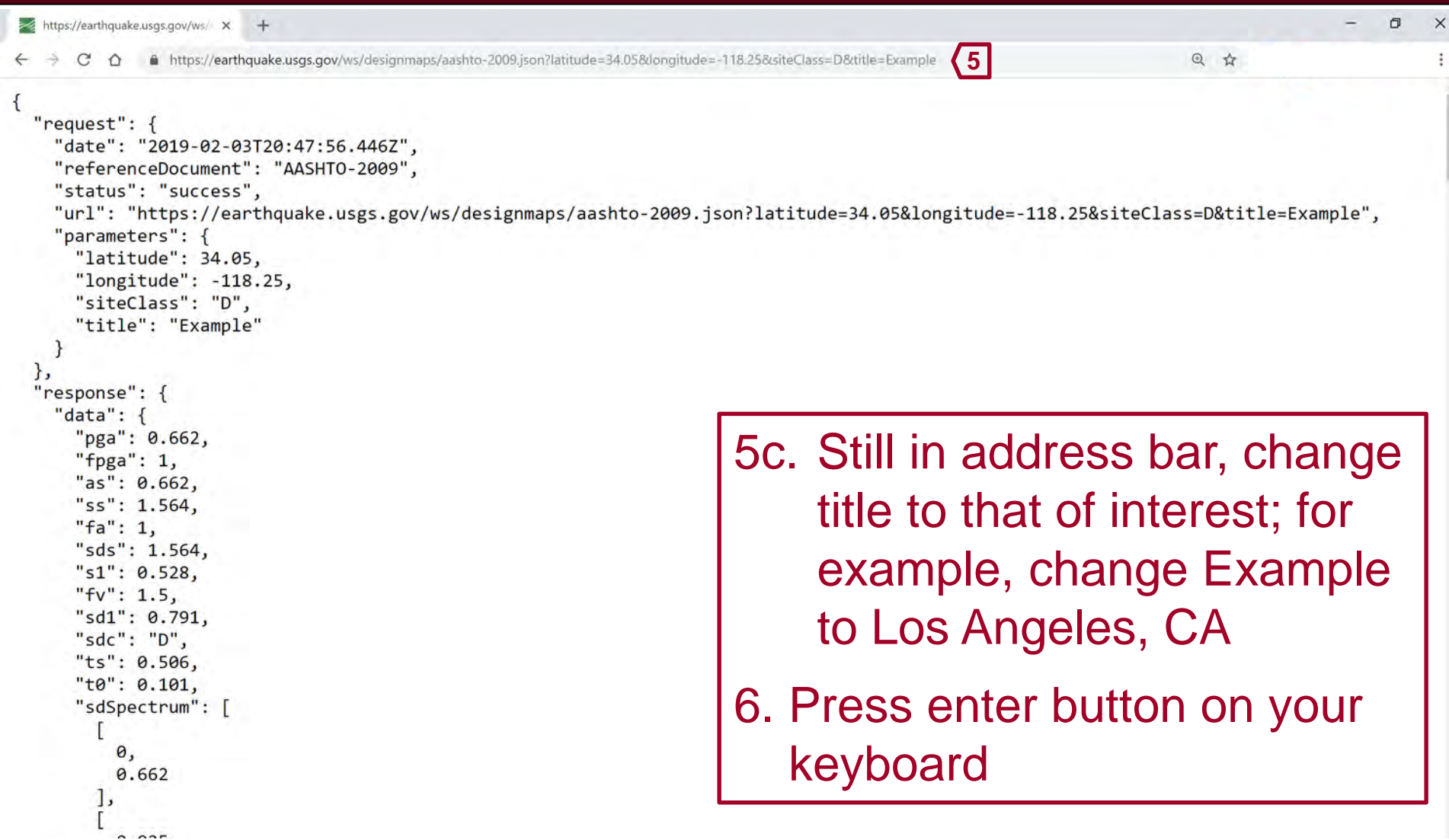
```
{
  "request": {
    "date": "2019-02-03T20:44:47.708Z",
    "referenceDocument": "AASHTO-2009",
    "status": "success",
    "url": "https://earthquake.usgs.gov/ws/designmaps/aashto-2009.json?latitude=34.05&longitude=-118.25&siteClass=C&title=Example",
    "parameters": {
      "latitude": 34.05,
      "longitude": -118.25,
      "siteClass": "C",
      "title": "Example"
    }
  },
  "response": {
    "data": {
      "pga": 0.662,
      "fpga": 1,
      "as": 0.662,
      "ss": 1.564,
      "fa": 1,
      "sds": 1.564,
      "s1": 0.528,
      "fv": 1.3,
      "sd1": 0.686,
      "sdc": "D",
      "ts": 0.438,
      "t0": 0.088,
      "sdSpectrum": [
        [
          0,
          0.662
        ],
        [
```

5b. Still in address bar, change site class to that of interest (A, B, C, D, or E); for example, change C to D

Step-by-step instructions: Steps 5c-6 of 9

https://earthquake.usgs.gov/ws/designmaps/aashto-2009.json?latitude=34.05&longitude=-118.25&siteClass=D&title=Example ⑤
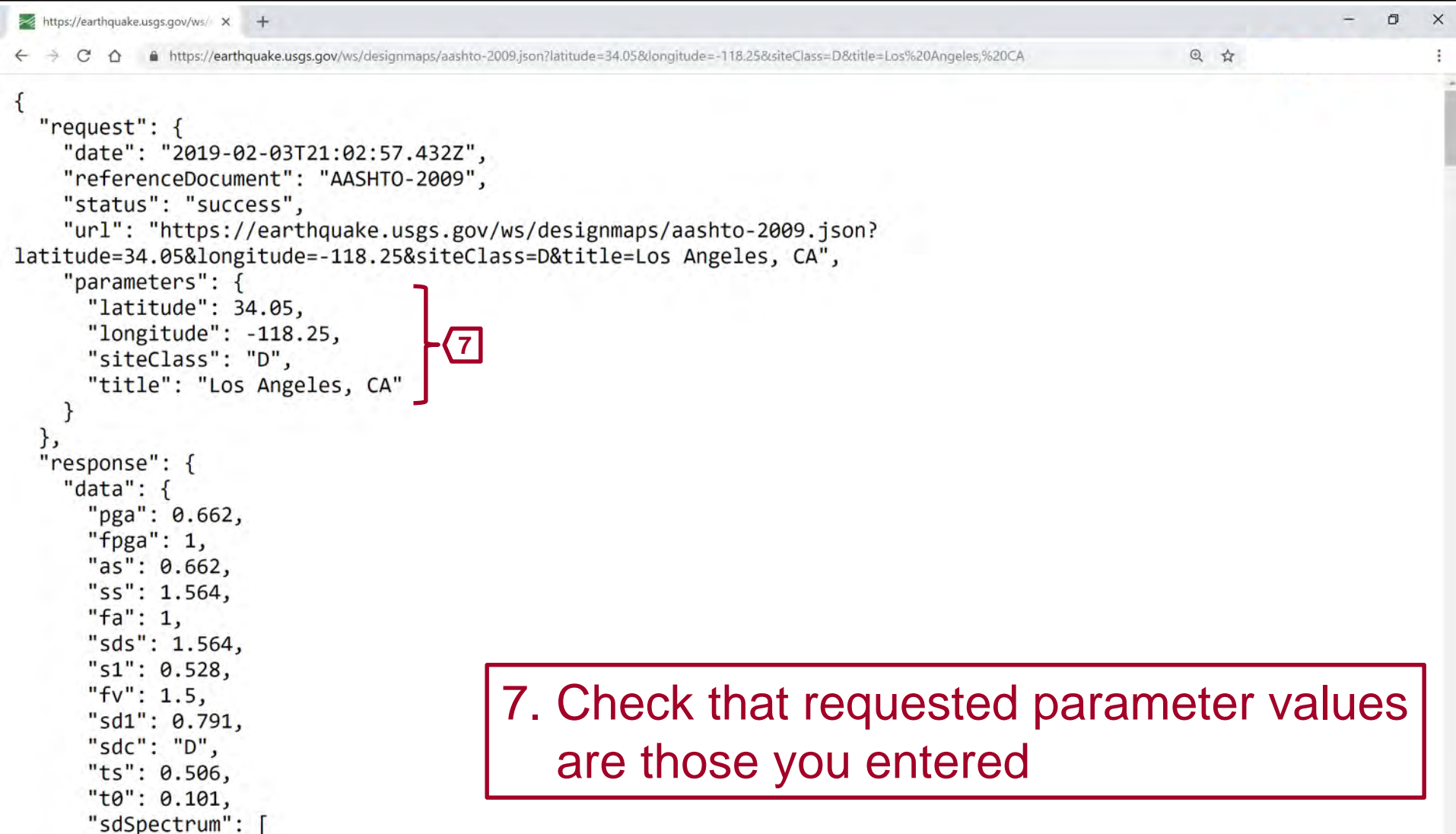
```
{
  "request": {
    "date": "2019-02-03T20:47:56.446Z",
    "referenceDocument": "AASHTO-2009",
    "status": "success",
    "url": "https://earthquake.usgs.gov/ws/designmaps/aashto-2009.json?latitude=34.05&longitude=-118.25&siteClass=D&title=Example",
    "parameters": {
      "latitude": 34.05,
      "longitude": -118.25,
      "siteClass": "D",
      "title": "Example"
    }
  },
  "response": {
    "data": {
      "pga": 0.662,
      "fpga": 1,
      "as": 0.662,
      "ss": 1.564,
      "fa": 1,
      "sds": 1.564,
      "s1": 0.528,
      "fv": 1.5,
      "sd1": 0.791,
      "sdc": "D",
      "ts": 0.506,
      "t0": 0.101,
      "sdSpectrum": [
        [
          0,
          0.662
        ],
        [
```

5c. Still in address bar, change title to that of interest; for example, change Example to Los Angeles, CA

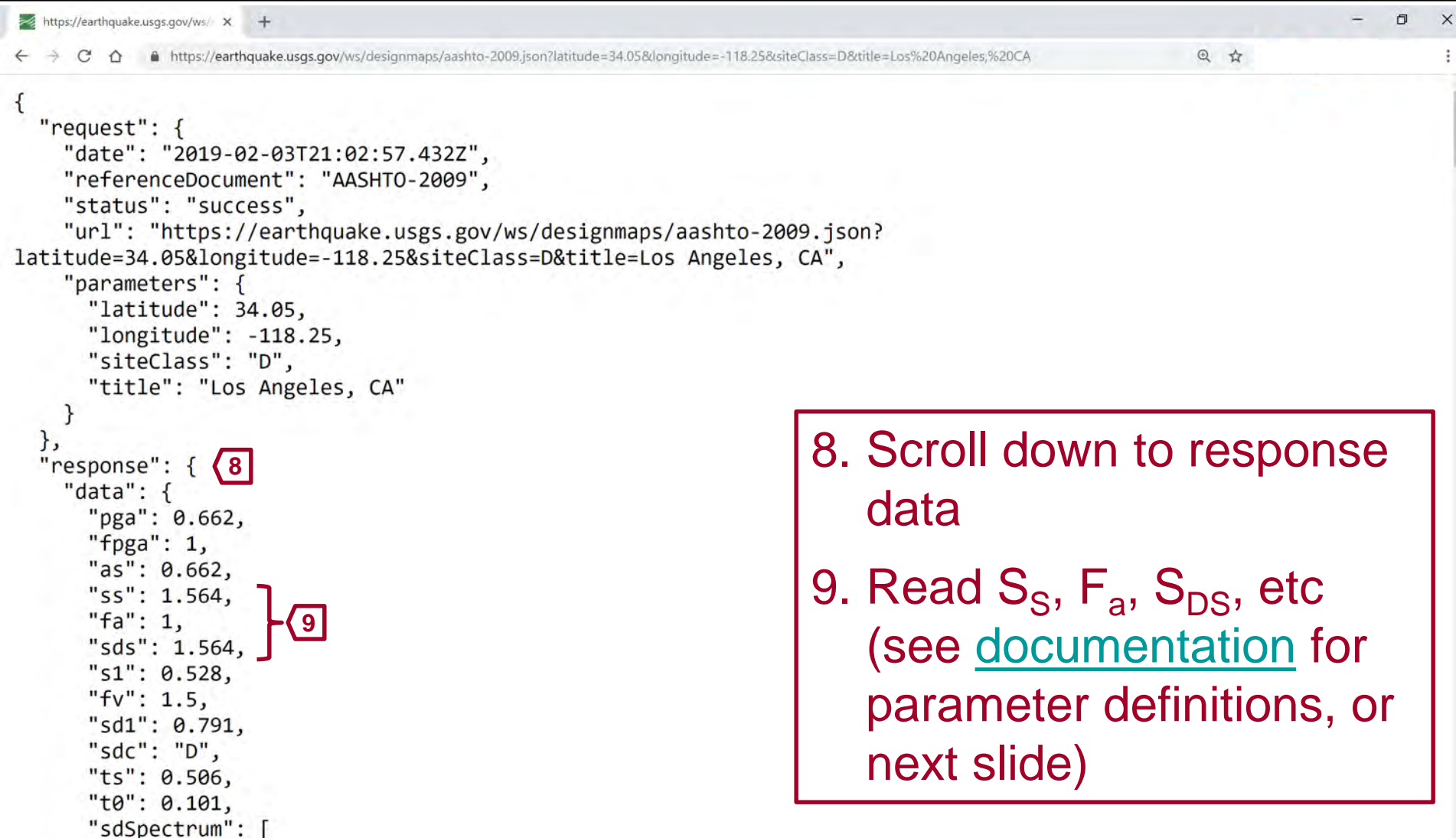6. Press enter button on your keyboard

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https://earthquake.usgs.gov/ws/ × +

← → C ⌂ 🔒 https://earthquake.usgs.gov/ws/designmaps/aashto-2009.json?latitude=34.05&longitude=-118.25&siteClass=D&title=Los%20Angeles,%20CA

```
{
  "request": {
    "date": "2019-02-03T21:02:57.432Z",
    "referenceDocument": "AASHTO-2009",
    "status": "success",
    "url": "https://earthquake.usgs.gov/ws/designmaps/aashto-2009.json?
latitude=34.05&longitude=-118.25&siteClass=D&title=Los Angeles, CA",
    "parameters": {
      "latitude": 34.05,
      "longitude": -118.25,
      "siteClass": "D",
      "title": "Los Angeles, CA"
    }
  },
  "response": {
    "data": {
      "pga": 0.662,
      "fpga": 1,
      "as": 0.662,
      "ss": 1.564,
      "fa": 1,
      "sds": 1.564,
      "s1": 0.528,
      "fv": 1.5,
      "sd1": 0.791,
      "sdc": "D",
      "ts": 0.506,
      "t0": 0.101,
      "sdSpectrum": [
```

⑦

7. Check that requested parameter values are those you entered

https://earthquake.usgs.gov/ws/ ✕ +

← → C ⌂ 🔒 https://earthquake.usgs.gov/ws/designmaps/aashto-2009.json?latitude=34.05&longitude=-118.25&siteClass=D&title=Los%20Angeles,%20CA ⊕ ☆ ⋮

```
{
  "request": {
    "date": "2019-02-03T21:02:57.432Z",
    "referenceDocument": "AASHTO-2009",
    "status": "success",
    "url": "https://earthquake.usgs.gov/ws/designmaps/aashto-2009.json?
latitude=34.05&longitude=-118.25&siteClass=D&title=Los Angeles, CA",
    "parameters": {
      "latitude": 34.05,
      "longitude": -118.25,
      "siteClass": "D",
      "title": "Los Angeles, CA"
    }
  },
  "response": {   8
    "data": {
      "pga": 0.662,
      "fpga": 1,
      "as": 0.662,
      "ss": 1.564,
      "fa": 1,        9
      "sds": 1.564,
      "s1": 0.528,
      "fv": 1.5,
      "sd1": 0.791,
      "sdc": "D",
      "ts": 0.506,
      "t0": 0.101,
      "sdSpectrum": [
```

8. Scroll down to response data

9. Read S_S, F_a, S_{DS}, etc (see documentation for parameter definitions, or next slide)

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Parameter Definitions

https://earthquake.usgs.gov/ws/designmaps/aashto-2009.html

response

  data

    pga
      PGA, the mapped horizontal Peak Ground Acceleration, in units of g

    fpga
      F_{PGA}, the site coefficient for PGA, from Table 3.4.2.3-1 of the seismic design reference document

    as
      $A_s = F_{PGA} \times PGA$ (Equation 3.4.1-1), the design peak ground acceleration, in units of g

    ss
      S_S, the mapped short-period (0.2-second) spectral acceleration, in units of g

    fa
      F_a, the site coefficient for S_S, from Table 3.4.2.3-1

    sds
      $S_{DS} = F_a \times S_S$ (Equation 3.4.1-2), the design short-period (0.2-second) spectral acceleration, in units of g

    s1
      S_1, the mapped 1-second spectral acceleration, in units of g

    fv
      F_v, the site coefficient for S_1, from Table 3.4.2.3-2

    sd1
      $S_{D1} = F_v \times S_1$ (Equation 3.4.1-3), the design 1-second spectral acceleration, in units of g

    sdc
      SDC, the Seismic Design Category from Table 3.5-1

    ts
      $T_S = S_{D1} / S_{DS}$ (Equation 3.4.1-6), in seconds, for construction of design response spectrum

    t0
      $T_0 = 0.2 T_S$ (Equation 3.4.1-5), in seconds, for construction of design response spectrum

    sdSpectrum
      S_a, the design response spectrum from Figure 3.4.1-1 and Equation 3.4.1-4

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